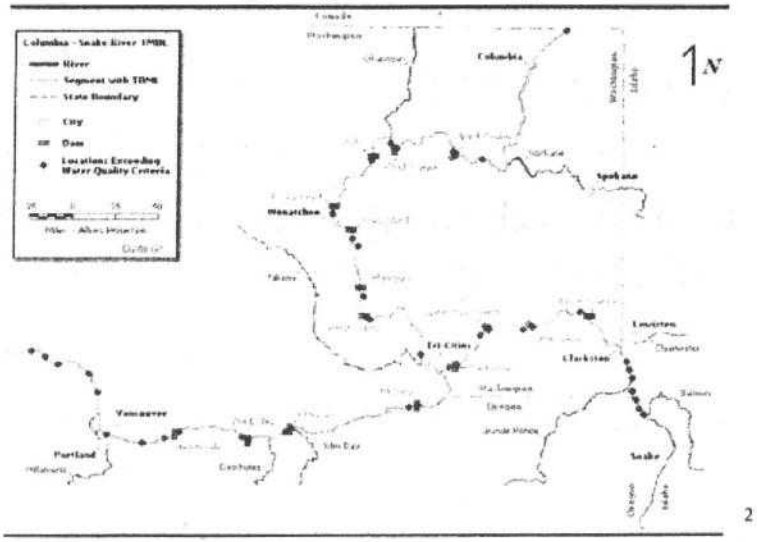
Columbia/Snake Rivers

Temperature TMDL

U.S. EPA Region 10

Geographic Scope



Important Term

Site Potential Temperature (SP):

Temperature that would occur in the main stems if the effects of human activity on temperature within the main stems in the TMDL Project Area are eliminated.

3

Summary of Temperature Goals

- At Columbia River Mile 4:

- 0.14 °C over Site Potential Temperature (SP) if SP exceeds 20 °C;

- 1.1 °C over SP if SP is less than 20 °C.

4

Summary of Temperature Goals

- Where Salmonid Spawning Occurs along the Oregon/Washington Border:

Now 0.3 deg C now 13.0 °C

- 0.14 °C over SP if SP exceeds 12.8 °C between October 1 and May 31;
  - The TMDL establishes that salmonid spawning occurs upstream of RM 112 (I 205 bridge).

Now RM 141

5

Now Oct. 15

Summary of the Allocations

- The rivers are divided into 21 reaches;
- Each reach receives an allocation in terms of temperature increase over site potential.

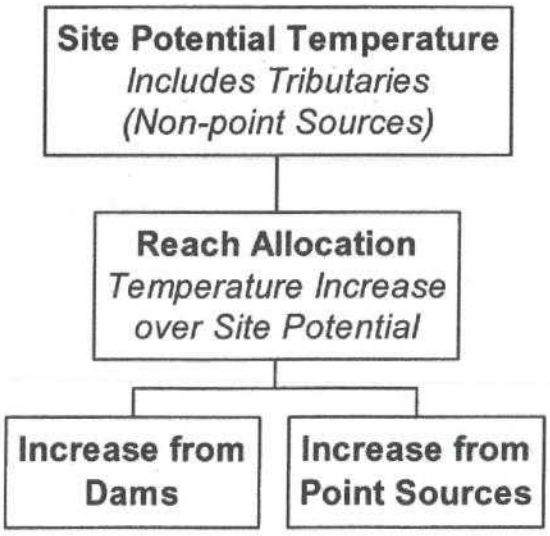
6

Summary of the Allocations

- That allocation represents the temperature increase allowed to result from human activities in the main stems.
- The allocations are established to meet the temperature goals.

7

Schematic of Reach Allocations



8

Summary of Allocations

- The reach allocations are based on:
  - the temperature increase caused by existing point sources;
  - an additional 20 MW of heat energy to account for general NPDES permits and future growth;

9

Summary of Allocations

  - an allocation for the dam in the reach;
  - tributaries are allocated their existing loads and are treated as part of the site potential temperature.

10

Example Allocations by Reach

Site	Increase	WLA	LA
Gr Coulee	0.0109 °C	0.0009 °C	0.01 °C
Ch Joseph	0.0109 °C	0.0009 °C	0.01 °C
Wells	0.0105 °C	0.0005 °C	0.01 °C
Rocky R	0.0106 °C	0.0006 °C	0.01 °C
Rock Is	0.0109 °C	0.0009 °C	0.01 °C
Wanapum	0.0104 °C	0.0004 °C	0.01 °C
Priest R	0.0904 °C	0.0004 °C	0.09 °C

11

Wasteload Allocations

- 106 point sources with Individual permits:
  - 95 with very little temperature impact are grouped by reach and given group allocations;
  - 11 facilities are given individual allocations.

12

Wasteload Allocations

- 158 point sources with general permits are accounted for in the group allocations.
- WLA are established in megawatts (MW).

13

Example of WLA

River Reach/ Facility	Group Allocations	Individual Allocations
Priest R to McNary	244.13 MW	791.4MW
Agrium Bowles Rd		206.8 MW
Agrium GF Rd		384.5 MW
Boise Cascade W		200.1 MW
McNary to John D	59.81 MW	0.0 MW
John D to T Dalles	20.73 MW	0.0 MW

14

Effects on River Users

- Dams are allowed essentially no increase over site potential:
  - 0.09 °C for Priest Rapids;
  - 0.01 °C for the other dams.

15

Effects on River Users

- Point Sources with individual permits are generally allowed their existing discharges.
- Point sources with general permits are allowed their existing discharges.

16

Effects on River Users

- Some future growth is allowed via the group allocations.
- Tributaries are allowed their existing loads.

17

Effects on River Users

- The majority of the non-point temperature impacts are via the tributaries.
- Therefore they are given their existing loads in this TMDL.
- They may receive different load allocations when the tributary TMDLs are completed.

18

Tributaries

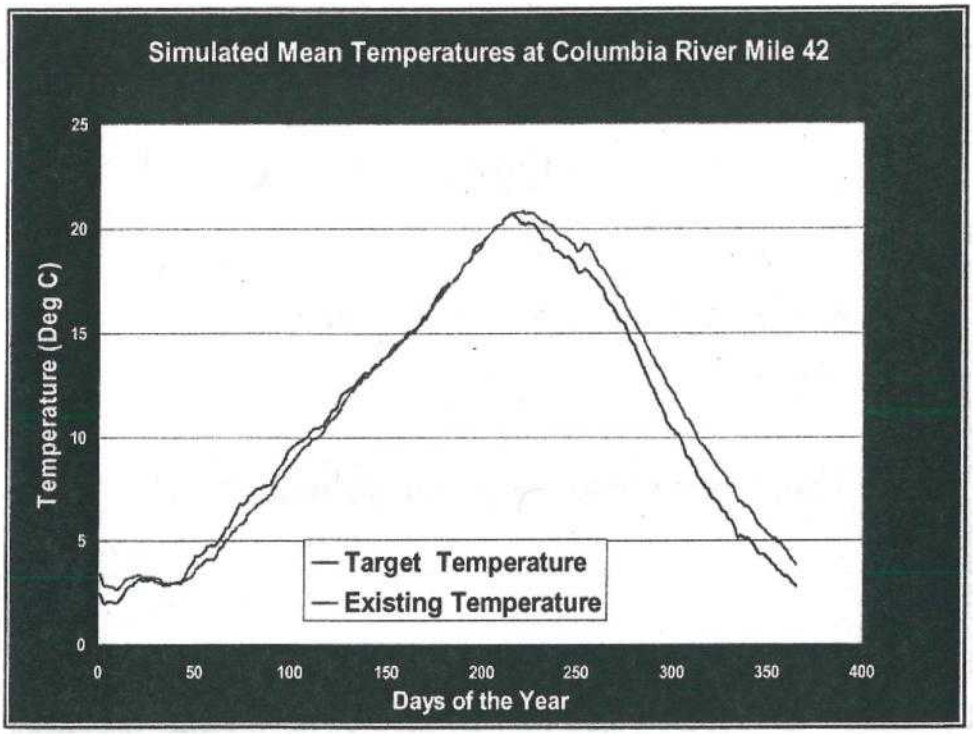
- Why are tributaries loads not established?
  - WQS based on natural conditions;
  - TMDL focus is on the main stem human activities;
  - Changing tributary temperatures would have little effect on the temperature increases allowed.

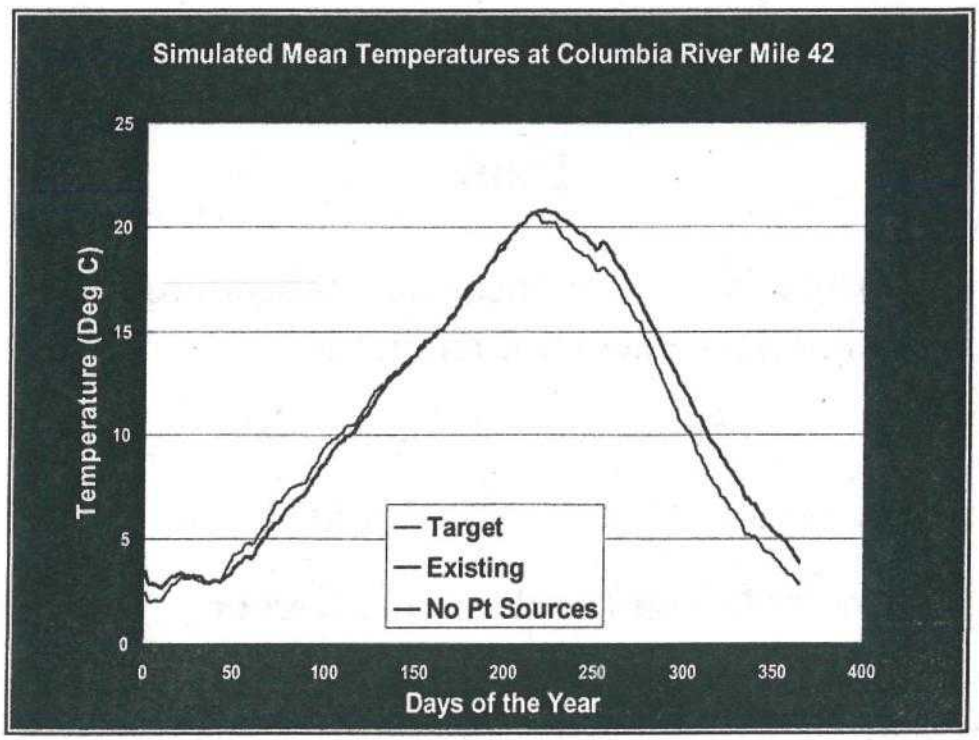
19

Dams VS Point Sources

- Why no allocation for dams and full allocations for point sources?
  - Dams have much greater impacts on temperature than the point sources;
  - Limiting the point sources would not benefit the dams.

20


Simulated Mean Temperatures at Columbia River Mile 42
Temperature (Deg C)
25
20
15
10
5
0
0
50
100
150
200
250
300
350
400
Days of the Year
— Target Temperature
— Existing Temperature


Simulated Mean Temperatures at Columbia River Mile 42
Temperature (Deg C)
25
20
15
10
5
0
0
50
100
150
200
250
300
350
400
Days of the Year
— Target
— Existing
— No Pt Sources

Potential Effect of this TMDL on Dams

- Varies with the effect of the dams on temperature.
- Three fairly distinct groups of dams.

23

Potential Effect of this TMDL on Dams

Dams that clearly increase temperature by more than a degree Centigrade:

Grand Coulee	John Day
Lower Granite	Little Goose
Lower Monumental	Ice Harbor

24

Potential Effect of this TMDL on Dams

Dams with highly variable impacts up to a degree Centigrade:

Chief Joseph

Wanapum

25

Potential Effect of this TMDL on Dams

Dams with highly variable impacts from no impact to 1/2 a degree Centigrade:

Wells

Rock Island

McNary

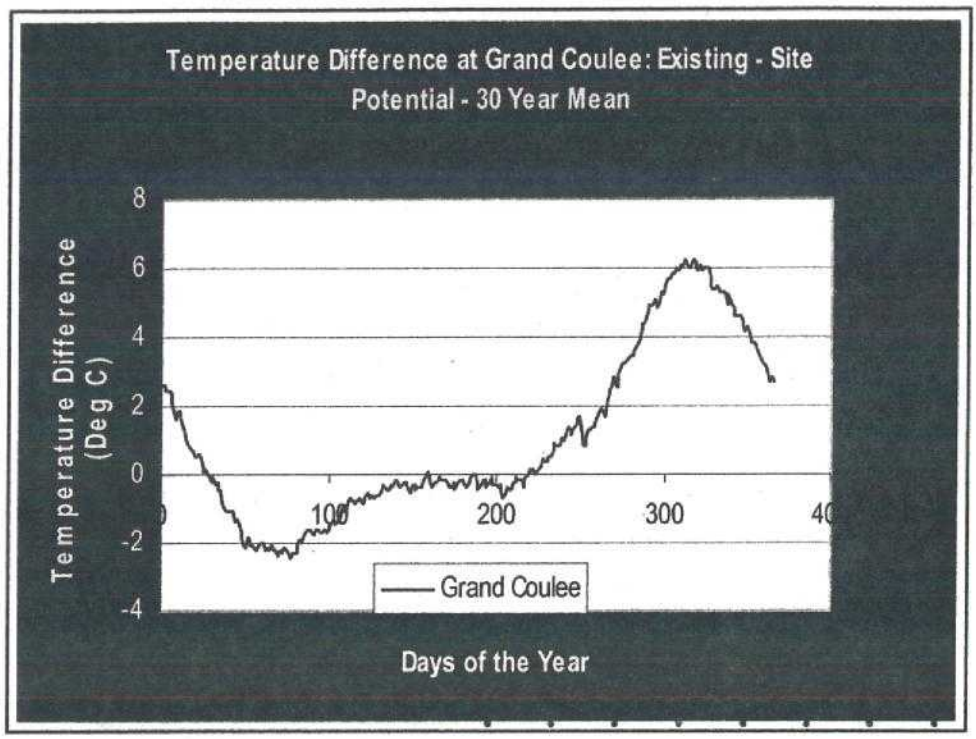
Bonneville

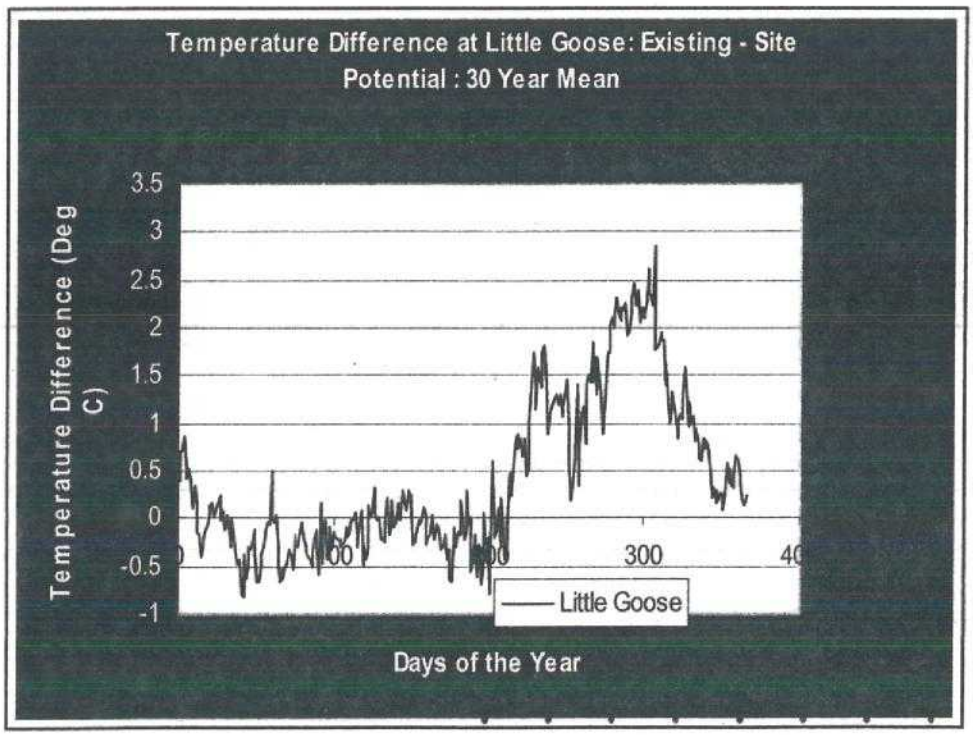
Rocky Reach

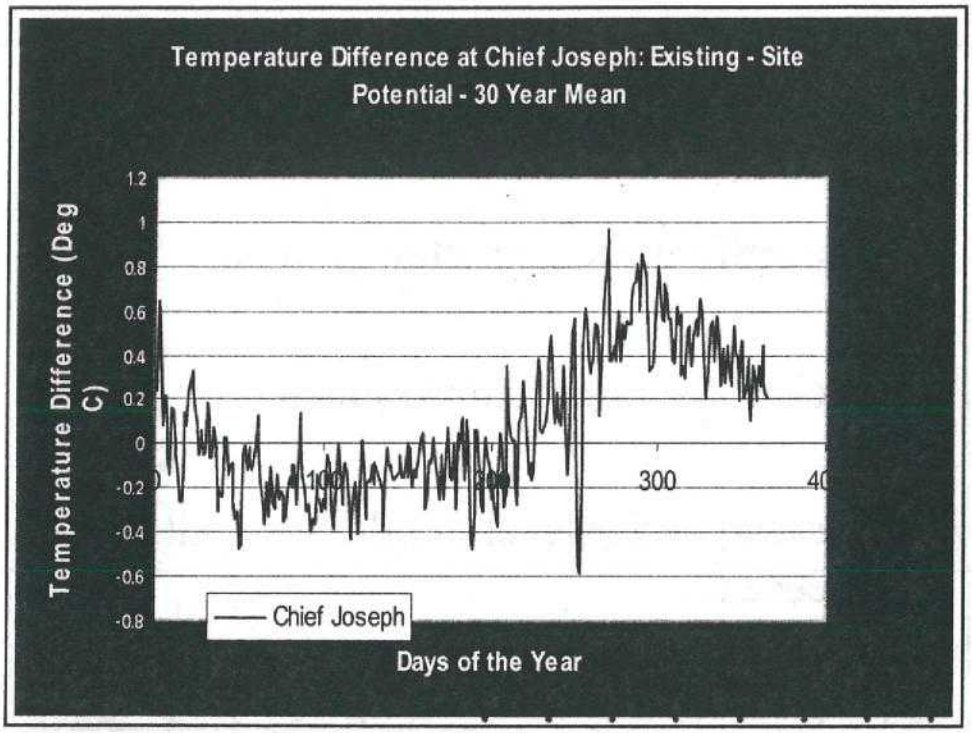
Priest Rapids

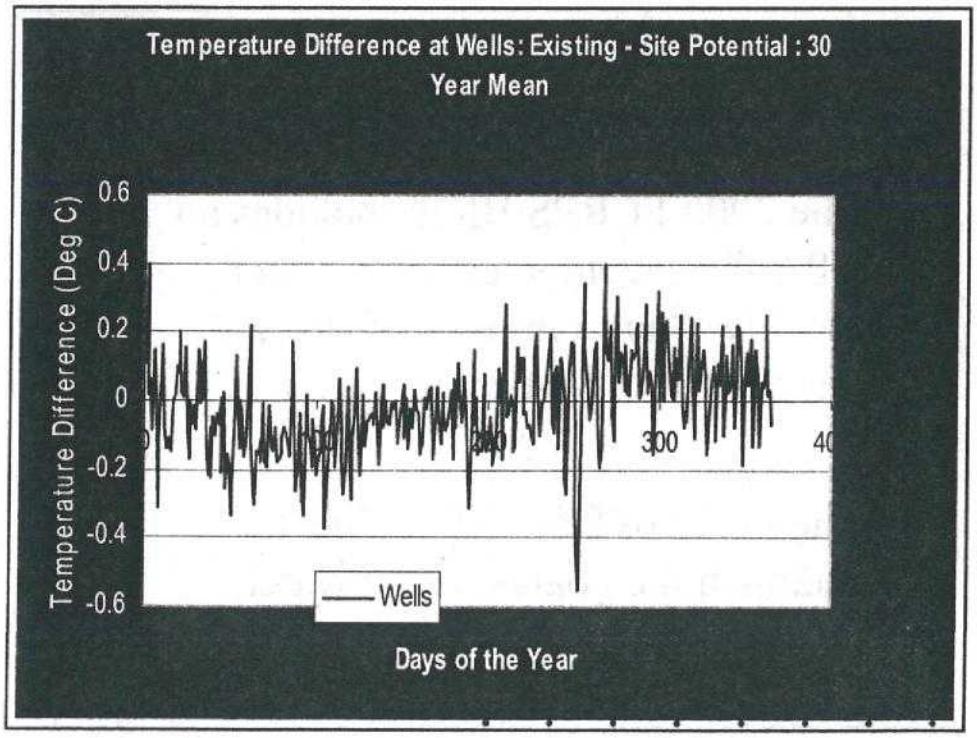
The Dalles

26


Temperature Difference at Grand Coulee: Existing - Site Potential - 30 Year Mean
Temperature Difference (Deg C)
8
6
4
2
0
-2
-4
100
200
300
Grand Coulee
Days of the Year


Temperature Difference at Little Goose: Existing - Site Potential : 30 Year Mean
Temperature Difference (Deg C)
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
300
Little Goose
Days of the Year


Temperature Difference at Chief Joseph: Existing - Site Potential - 30 Year Mean
Temperature Difference (Deg C)
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
300
Chief Joseph
Days of the Year


Temperature Difference at Wells: Existing - Site Potential : 30 Year Mean
Temperature Difference (Deg C)
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
300
Wells
Days of the Year

Role of the TMDL

- quantify the temperature problem;
- define the target temperatures;
- determine the level of improvement needed.

31

Role of the TMDL

- The 2000 FCRPS BIOP includes an RPA for development of a Water Quality Plan to improve TDG and temperature in the main stems.
- The intent of this TMDL was to establish the goals for that water quality plan.

32

Next Steps

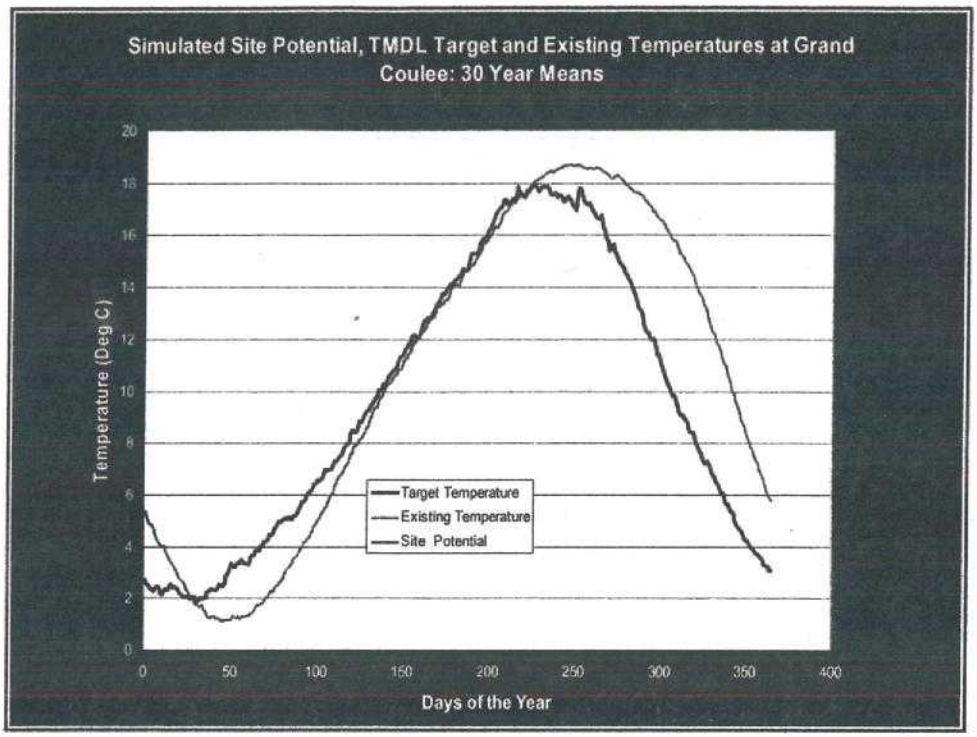
- TMDL implementation plan;
- The BIOP Water Quality Plan;

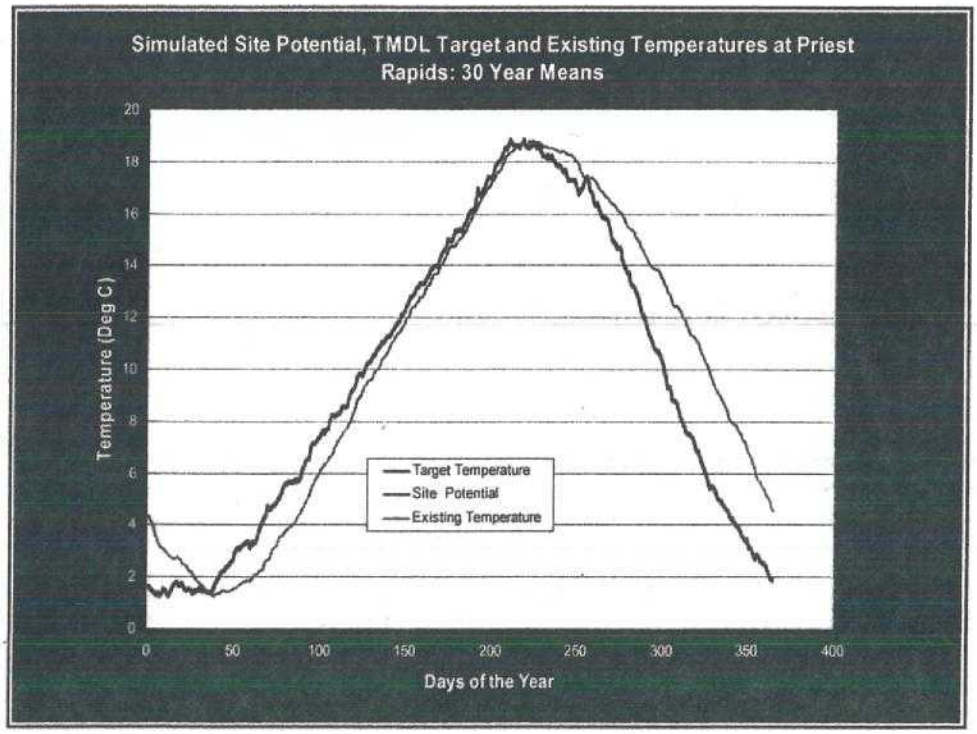
33

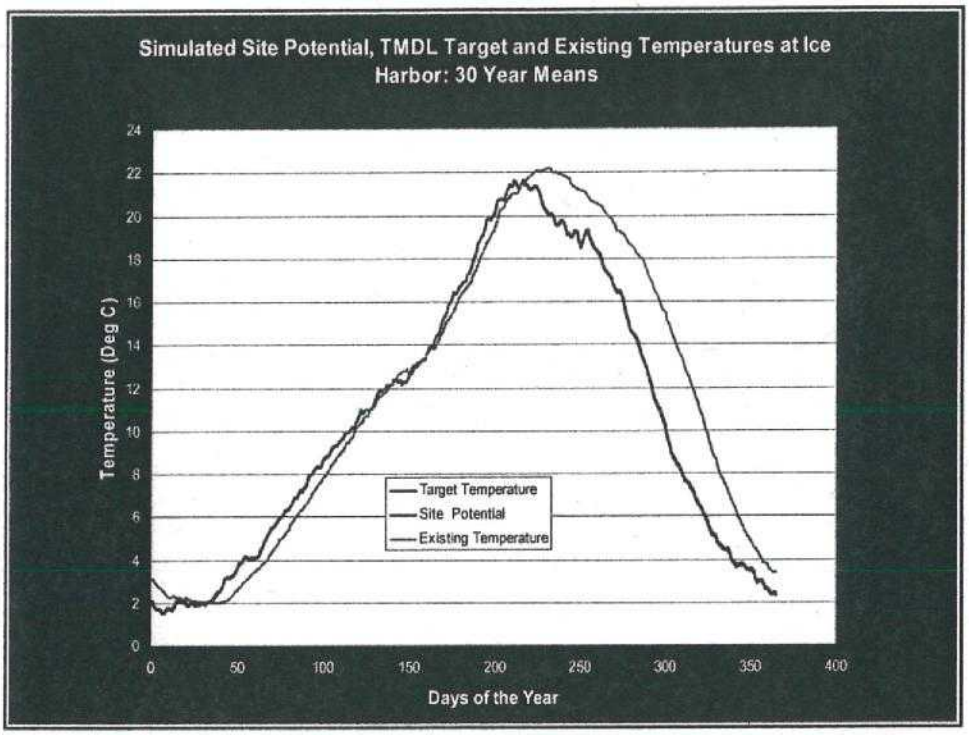
Next Steps

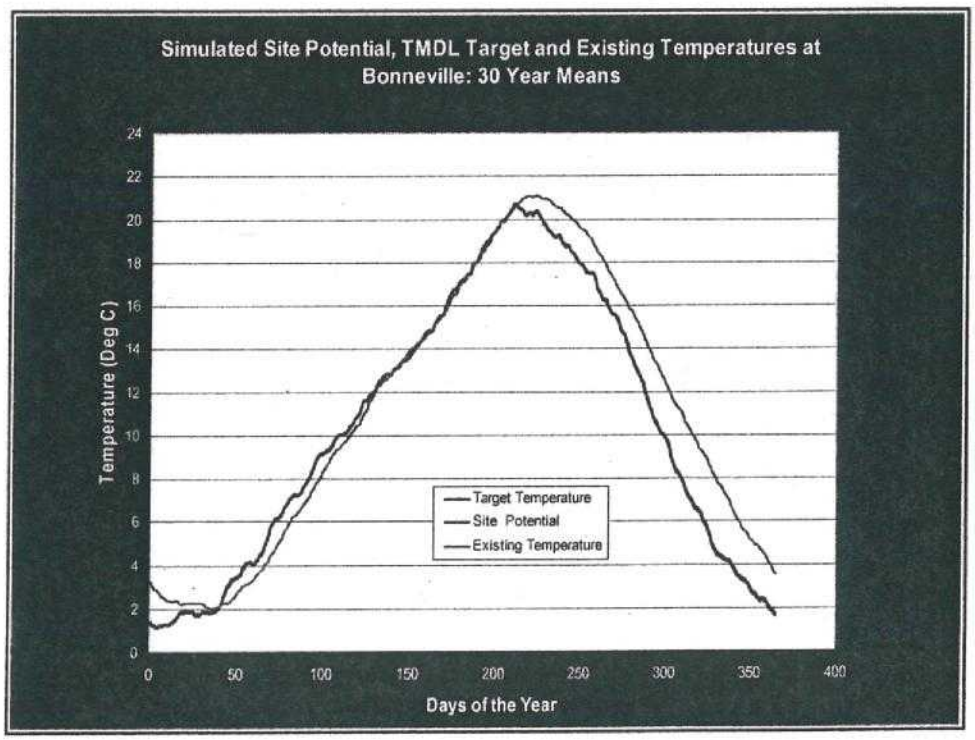
- Determine what can be done at dams to improve temperature;
- Determine the costs;
- Determine the benefits;
- Make a decision to improve the dams or recognize that improvement is not possible and amend the WQS.

34


Simulated Site Potential, TMDL Target and Existing Temperatures at Grand Coulee: 30 Year Means
Temperature (Deg C)
Days of the Year
Target Temperature
Existing Temperature
Site Potential


Simulated Site Potential, TMDL Target and Existing Temperatures at Priest Rapids: 30 Year Means
Temperature (Deg C)
Days of the Year
Target Temperature
Site Potential
Existing Temperature


Simulated Site Potential, TMDL Target and Existing Temperatures at Ice Harbor: 30 Year Means
Temperature (Deg C)
Days of the Year
Target Temperature
Site Potential
Existing Temperature
0
2
4
6
8
10
12
14
16
18
20
22
24
0
50
100
150
200
250
300
350
400


Simulated Site Potential, TMDL Target and Existing Temperatures at Bonneville: 30 Year Means
Temperature (Deg C)
Days of the Year
Target Temperature
Site Potential
Existing Temperature
0
2
4
6
8
10
12
14
16
18
20
22
24
0
50
100
150
200
250
300
350
400